



**ENTERGY**

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August 4, 1992

2CAN089204

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Mail Station P1-137  
Washington, DC 20555

Subject: Arkansas Nuclear One - Unit 2  
Docket No. 50-368  
License No. NPF-f  
Technical Specification Change Request  
Concerning Emergency Feedwater Turbine  
Driven Pump Surveillance Testing

Gentlemen:

Attached for your review and approval is a proposed Technical Specification (TS) change revising the required value of the steam supply pressure for the Arkansas Nuclear One - Unit 2 (ANO-2) turbine driven emergency feedwater (EFW) pump surveillance test as specified in TS 1.2.a.1. This change also rewords the specification to clarify that required secondary steam supply pressure is steam generator pressure.

In order to inhibit suspected steam generator tube damage mechanism, ANO-2 is considering operating at a reduced hot leg temperature value. This reduction in hot leg temperatures will result in a secondary steam supply pressure that is below the value specified for surveillance testing of the turbine driven EFW pump. In order to perform the surveillance, ANO-2 would be required to reduce plant load or raise hot leg temperature to raise secondary steam supply pressure to the specified value. This evolution is not considered desirable in that a possibility of a reactor transient is introduced due to primary temperature effects, secondary system induced perturbations, and reactor power changes affecting xenon, tilt, and axial power shape. This change will allow surveillance testing of the turbine driven EFW pump, while operating in a stable reduced hot leg temperature condition.

The proposed change has been evaluated in accordance with 10CFR50.91(a)(1) using criteria in 10CFR50.92(c) and it has been determined that the change involves no significant hazards considerations. The bases for these determinations are included in the attached submittal.

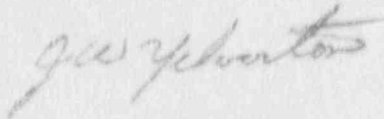
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ADD

Entergy Operations requests that the effective date for this change be immediately upon NRC issuance of the amendment. Although this request is neither exigent nor emergency, your prompt review and approval is requested in order to allow surveillance testing of the turbine driven EFW pump during operation at reduced hot leg temperatures, with no unit load reduction to increase steam supply pressure.

Very truly yours,



JWY/sjf  
Attachments

cc: Mr. James L. Milhoan  
U. S. Nuclear Regulatory Commission  
Region IV  
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Arlington, TX 76011-8064

NRC Senior Resident Inspector  
Arkansas Nuclear One - ANO-1 & 2  
Number 1, Nuclear Plant Road  
Russellville, AR 72771

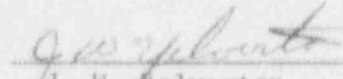
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STATE OF ARKANSAS        )  
                                  )  
COUNTY OF LOGAN        )        SS

Affidavit

I, J. W. Yelverton, being duly sworn, subscribe to and say that I am Vice President, Operations ANO for Entergy Operations, that I have full authority to execute this affidavit; that I have read the document numbered 2CAN089204 and know the contents thereof; and that to the best of my knowledge, information and belief the statements in it are true.

  
J. W. Yelverton

SUBSCRIBED AND SWORN TO before me, a Notary Public in and for the County and State above named, this 4<sup>th</sup> day of August, 1992.

  
Notary Public

My Commission Expires:

May 11, 2000

ATTACHMENT  
PROPOSED TECHNICAL SPECIFICATION  
AND  
RESPECTIVE SAFETY ANALYSES  
IN THE MATTER OF AMENDING  
LICENSE NO. NPF-6  
ENERGY OPERATIONS, INC.  
ARKANSAS NUCLEAR ONE, UNIT TWO  
DOCKET NO. 50-368

## DESCRIPTION OF PROPOSED CHANGE

The proposed change revises the value of the secondary steam supply pressure specified in Technical Specifications (TS) 4.7.1.2.a.1 from "greater than 865 psig" to "greater than 800 psia". This change also rewords TS 4.7.1.2.a.1 such that "secondary steam supply pressure" is now "steam generator pressure".

## BACKGROUND

Arkansas Nuclear One - Unit 2 (ANO-2) is considering reducing the primary side temperatures in order to inhibit a suspected steam generator (SG) tube damage mechanism. Currently, the unit is operating at 100% power with hot leg temperature of 607°F and cold leg temperature of 553°F. These temperatures will be reduced to approximate values of 599°F and 545°F, respectively.

The reduction in the primary side temperature is being considered to mitigate the consequences of intergranular stress corrosion cracking (IGSCC) which is the most probable cause of degradation of the ANO-2 SG tubes. IGSCC is considered a problem in Alloy 600 steam generators fabricated using high temperature mill annealed tubing. The attack has generally taken place in higher temperature/higher stress regions of the steam generators such as hot leg roll transitions and U-bends. Severely dented tube support intersections have also been subject to IGSCC. Laboratory and field experience developed for Alloy 600 tubing has resulted in identification of characteristics which affect the susceptibility of a given Alloy 600 component to IGSCC. One of the major factors believed to contribute to IGSCC susceptibility is high temperature. This is confirmed by the preponderance of hot leg occurrences of defects in Alloy 600 tubing. The strong influence of temperature is indicative of a thermally activated process whose rate can be expressed in terms of an Arrhenius rate equation. A generally accepted estimate of the temperature effect doubles the time-to-failure for each 18°F reduction in operating temperature.

This reduction in primary side temperature to inhibit IGSCC attack on the SG tubes will also result in the reduction of the steam generator pressure from an approximate value of 915 psia to 850 psia.

## DISCUSSION OF CHANGE

Currently, TS 4.7.1.2.a.1 requires that the turbine driven emergency feedwater (EFW) pump supply  $\geq 485$  gpm to the SG at a discharge pressure of  $\geq 1200$  psig when secondary steam supply pressure is greater than 865 psig. The reduction in hot leg temperature will result in a secondary steam supply pressure that is below the value specified for surveillance testing of the turbine driven EFW pump. In order to meet the specified secondary steam supply pressure in the existing specification, ANO-2 would be required to raise hot leg temperature or reduce plant load until secondary steam supply pressure exceeded 865 psig, perform the surveillance test, and then reduce hot leg temperature or increase plant load until the desired plant condition is achieved. Performing this evolution on a monthly basis could increase the possibility of a reactor transient due to



primary temperature effects, reactor power changes affecting xenon, tilt and axial power shape, and secondary system induced perturbations. Implementing this change results in a specified secondary steam supply pressure that is lower than the nominal steam generator pressure at reduced hot leg temperature conditions, and allows surveillance testing of the turbine driven EFW pump in a stable reduced hot leg temperature condition.

The pump curves for the turbine driven EFW pump show that a 485 gpm flow rate, at a discharge pressure of 1277 psig, requires a power of 480 bhp at a speed of 3575 rpm. The turbine driver expected performance curve shows that a steam inlet pressure of 250 psig available to the trip and throttle valve of the turbine driver is sufficient to develop 480 bhp. At a secondary steam supply pressure of 800 psia, the steam pressure at the turbine driver inlet will greatly exceed 250 psig. Therefore, the proposed reduction in required secondary steam supply pressure will not affect the turbine driven EFW pump's capability to deliver the required flowrate and discharge pressure during operation. Design calculations have shown the turbine driven EFW pump is capable of supplying the required flowrate and discharge pressure for existing plant conditions applicable to a secondary steam supply pressure range of 60 to 1100 psia.

The change specifying steam generator pressure with units in psia as the secondary steam supply pressure for the purposes of this surveillance test is intended to clarify the specification. It reflects the instrumentation used to measure secondary steam supply pressure for this surveillance and is purely administrative in nature.

#### DETERMINATION OF SIGNIFICANT HAZARDS

An evaluation of the proposed change has been performed in accordance with 10CFR50.91(a)(1) regarding no significant hazards considerations using the standards in 10CFR50.92(c). A discussion of these standards as they relate to this amendment request follows:

Criterion 1 - Does Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated.

The accident mitigation features of the plant are not affected by the proposed amendment. No modification has been made to the pump or turbine driver. The specified values of flowrate and discharge pressure for the surveillance testing of the turbine driven EFW pump remain unchanged. The capability of the turbine driven EFW pump to perform its required function is not impacted by this change. Design calculations show that the turbine driven EFW pump is capable of delivering required flowrate and discharge pressure for existing plant conditions applicable to a secondary steam supply pressure range of 60 to 1100 psia. The change specifying steam generator pressure as the secondary steam supply pressure is purely administrative in nature and is intended to clarify the specification.

Therefore, this change does not involve a significant increase in the probability or consequences of any accident previously evaluated.

Criterion 2 - Does Not Create the Possibility of a New or Different Kind of Accident from any Previously Evaluated.

No new possibility for an accident is introduced by modifying the specifications for the surveillance testing of the turbine driven EFW pump. The surveillance will continue to demonstrate the pump's ability to perform its safety function. The specified values of flowrate and discharge pressure for the surveillance test remain unchanged. Design calculations show that the turbine driven EFW pump is capable of delivering required flowrate and discharge pressure for existing plant conditions applicable to a secondary steam supply pressure range of 60 to 1100 psia. The change specifying steam generator pressure as the secondary steam supply pressure is purely administrative in nature and is intended to clarify the specification.

Therefore, this change does not create the possibility of a new or different kind of accident from any previously evaluated.

Criterion 3 - Does Not Involve a Significant Reduction in the Margin of Safety

The safety function of the turbine driven EFW pump is not altered as a result of this change. The pump's required flowrate and discharge pressure are not revised as a result of this change to secondary steam supply pressure. Design calculations show that the turbine driven EFW pump is capable of delivering required flowrate and discharge pressure for existing plant conditions applicable to a secondary steam supply pressure range of 60 to 1100 psia. The change specifying steam generator pressure as the secondary steam supply pressure is purely administrative in nature and is intended to clarify the specification.

Therefore, this change does not involve a significant reduction in the margin of safety.

Therefore, based on the reasoning presented above and the previous discussion of the amendment request, Entergy Operations has determined that the requested change does not involve a significant hazards consideration.